<u>AMENDMENTS TO THE DRAWINGS</u>

Applicants present 2 replacement sheets and 2 annotated sheets showing the changes made to the drawings.

In Figure 1, reference character "102" designating the user interface has been changed to "104".

In Figure 9, the label "Sort B" appearing in element 208 has been changed to "Table Scan B".

Attachment: 2 Replacement Sheets (Figures 1 and 9)

                                  2 Annotated Sheets Showing Changes Made (Figures 1 and 9)

REMARKS

Reconsideration and allowance of the claims are requested in view of the above amendments and the following remarks. The drawings and claims 1, 16, 36 and 45 have been amended. Support for the amendments may be found in the specification and claims as originally filed. For example, support for the claim amendments may be found in the specification at least at page 2, lines 6-12; page 4, line 26 to page 5, line 2; and Figure 2. No new matter has been added. Claims 2 and 46 have been canceled without prejudice or disclaimer.

Upon entry of this amendment, claims 1, 3-45 and 47-48 will be pending in the present application, with claims 1, 36 and 45 being independent.

1.   Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4). Applicants respectfully disagree for at least the following reasons.

Specifically, Figure 1 is objected to because the reference character "102" has been used to designate both the user interface and the database system. Figure 1 has been amended to overcome this objection.

Additionally, the Office Action asserts that neither labels "104" nor "106" appear in Figure 1. However, Figure 1 has been amended to include label "104". Label "106" already appears in Figure 1 at the top of the drawing.

Furthermore, the Office Action indicates that label "172" in Figure 7 is improperly used to indicate both "Table Scan A" and "Table Scan B". However, label "172" refers to multiple input nodes (i.e., Table Scan A and Table Scan B) feeding into a single node 174 (see specification, page 16, line 1). Therefore, the use of label "172" to indicate both "Table Scan A" and "Table Scan B" is correct, as "Table Scan A" and "Table Scan B" represent multiple input nodes.

Furthermore, the Office Action indicates that the label "Sort B" incorrectly appears twice in Figure 9. Figure 9 has been amended to overcome this objection.

For at least the reasons above, reconsideration and withdrawal of the objection to the drawings are respectfully requested.

2.   <u>Rejections Under 35 U.S.C. 112</u>

Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claims the subject matter which application regards as invention. Applicants respectfully traverse this rejection for at least the following reasons.

The Office Action on page 3 states that the phrase "defining a model of work performed during the execution of a query" is vague and indefinite, because it gives no indication as to what a model of work performed is and therefore leaves question as to the meaning of the claims.

The phrase "defining a model of work performed during the execution of a query", as recited in claim 1, is discussed in the specification at least at page 5, line 20 – page 6, line 13:

> <u>Model of Work</u>
> Query progress estimation is difficult in its most general setting. Database systems can have widely fluctuating runtime conditions. This makes it difficult to develop a model of work that can be used to accurately model query execution time. <u>In an exemplary embodiment, work W is modeled as a number of items, such as tuples or groups, returned by one or more query operators.</u> In this application, query operators refers to physical operators in a query execution plan. This measure of work is independent of time and is invariant across query runs.
> <u>In one embodiment, the model of work is based on the observation that in most existing database systems, query operators are usually implemented using an iterator</u>

model. In the iterator model, each physical query operator in the query execution plan exports a standard interface for query processing. The operators in this interface include Open( ), Close( ) and GetNext( ) calls. Each time a GetNext( ) operator is issued an item, such as a tuple or group is returned. Referring to FIG. 4, the work W is modeled 122 as the total number of GetNext( ) calls issued throughout the query pipeline including the root in one embodiment. The method counts 124 each GetNext( ) call K as a primitive operation of query processing and models 126 the total work done by the query as the total number N of GetNext( ) calls. Query progress is then estimated 128 by dividing the GetNext( ) count by the estimated total number of GetNext( ) operators.

This model though simple has a number of advantages. This model can be applied to any SQL query as most modern database system do employ a demand driven model for query evaluation. This measure of work is invariant across multiple query runs. It is simple and hence can easily be analyzed. (emphasis added)

Additionally, the specification discusses defining a model of work at page 2, lines 14–20. Based on the above discussions in the specification, which include an embodiment of a model of work, applicants submit that the meaning of the phrase "defining a model of work performed during the execution of a query", as recited in claim 1, is clear and not vague or indefinite as asserted by the Office Action.

For at least the reasons above, reconsideration and withdrawal of the rejection of claim 1 under 35 U.S.C. 112, second paragraph, are respectfully requested.

3.   Rejections Under 35 U.S.C. 101

Claims 1, 3–15, and 18–35 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non–statutory subject matter. Applicants respectfully traverse this rejection for at least the following reasons.

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The Office Action on page 3 asserts that claim 1 merely describes a method of estimating work and progress in a model of work for performing the execution of a query, and includes no tangible result as a product of the method. Additionally, the Office Action asserts that claims 3-15 and 18-35 further describe and add to the steps of the method, but fail to insert a tangible result.

Although applicants disagree with the above assertions, for purposes of economy of prosecution, independent claim 1 has been amended to incorporate the elements of claim 2. The Office Action indicates that displaying estimated progress of the query to a user, as recited in claim 2, adds a tangible result to the method and therefore resolves the issue for claim 2 and it's depending claims.

For at least the reasons above, reconsideration and withdrawal of the rejection of claims 1, 3-15, and 18-35 under 35 U.S.C. 101 are respectfully requested.

4.   Rejections Under 35 U.S.C. 102

Claims 1-2, 5, 16, 35-37, 43, 45-46, and 48 stand rejected under 35 U.S.C. 102(b) as being anticipated by Eigel-Danielson (U.S. Patent 6,301,580). Applicants respectfully traverse this rejection for at least the following reasons.

The Office Action on page 4 asserts that Eigel-Danielson discloses defining a model of work performed during execution of a query (citing col. 4, lines 25-44). The Office Action also asserts on page 5 that Eigel-Danielson discloses estimating a total amount of work that will be performed according to the model during execution of the query (citing col. 4, lines 29-35), estimating an amount of work performed according to the model at a given point during the execution of the query (citing col. 4, lines 3-12), and estimating the progress of the query using the amount of work performed and the total amount of work (citing col. 6, lines 25-28).

Eigel-Danielson discloses an adaptive progress indicator that displays the greater progress between a first variable that represents the progress of a search of a

data repository and a second variable that represents the progress of filling a display repository (see col. 2, lines 10-15). The first variable and the second variable are maintained (see col. 4, lines 3-9). The variables can be expressed in percentages. The progress of a search of a data repository can be measured by the number of kilobytes of data left to search the data repository, or the number of kilobytes of data repository already searched (see col. 2, lines 17-36; col. 4, lines 25-44). Therefore, Eigel-Danielson discloses measuring the progress of a search of a data repository <u>during execution of the search</u>. However, Eigel-Danielson fails to disclose or suggest the elements of <u>before execution of a query, defining a model of work to be performed during execution of the query</u>, as included in claim 1. Instead, Eigel-Danielson merely discloses measuring the progress of a search as it is actually being performed. Eigel-Danielson does not disclose or contemplate defining a model of work for a query prior to execution of the query.

Additionally, the Office Action asserts that Eigel-Danielson teaches estimating a total amount of work performed. As discussed above, Eigel-Danielson teaches that the progress of a search of a data repository can be measured by the number of kilobytes of data left to search the data repository. The Office Action asserts that the number of kilobytes in the repository being searched is estimated. However, Eigel-Danielson fails to disclose or suggest the elements of estimating a total amount of work that will be performed <u>according to the model of work defined before execution of the query</u>, as included in claim 1.

Furthermore, the Office Action asserts that Eigel-Danielson teaches that the amount of work performed during execution of the query is tracked/estimated using variables. As discussed above, Eigel-Danielson teaches that a first variable that represents the progress of a search of a data repository and a second variable that represents the progress of filling a display repository are maintained. However, Eigel-Danielson fails to disclose or suggest the elements of estimating an amount of work

performed <u>according to the model of work</u> at a given point during the execution of the query, as included in claim 1.

Furthermore, the Office Action asserts that Eigel-Danielson teaches that the progress of the query is expressed using percentages, e.g. the amount of work performed divided by the total work to be done. As discussed above, Eigel-Danielson teaches that the first and second variables can be expressed in percentages. However, Eigel-Danielson fails to disclose or suggest the elements of estimating the progress of the query using the estimated amount of work performed and the estimated total amount of work <u>based on the model of work</u>, as included in claim 1.

As a result, Eigel-Danielson fails to disclose or suggest each and every element of independent claim 1. Independent claims 36 and 45 have been amended to include similar elements.

Therefore, since Eigel-Danielson fails to disclose or even suggest each and every element of independent claims 1, 36 and 45, these claims are allowable.

Claims 5, 16 and 35 depend from claim 1. Claims 37 and 43 depend from claim 36. Claim 48 depends from claim 45. As discussed above, claims 1, 36 and 45 are allowable. For at least this reason, and the features recited therein, claims 5, 16, 35, 37, 43 and 48 are also allowable.

Since claims 2 and 46 have been canceled, the rejection of these claims is rendered moot.

For at least the reasons above, reconsideration and withdrawal of the rejection of claims 1-2, 5, 16, 35-37, 43, 45-46, and 48 under 35 U.S.C. 102 are respectfully requested.

5. <u>Rejections Under 35 U.S.C. 103</u>

A. Rejections Based on Eigel-Danielson and Lezius et al.

Claims 3, 6 and 38-39 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Eigel-Danielson in view of Lezius et al. ("TigerSearch Manual"). Applicants respectfully traverse this rejection for at least the following reasons.

As discussed above, Eigel-Danielson fails to disclose or suggest each and every element of independent claims 1 and 36. Lezius et al. fails to cure this defect in Eigel-Danielson.

Lezius et al. discloses a search tool (TIGERSearch) with an index-based architecture that enables fast access to the results of many partial searches (see page 1). However, Lezius et al. fails to disclose or suggest estimating the progress of a query based on an estimated amount of work performed according to a model of work at a given point during execution of the query and an estimated total amount of work to be performed according to the model of work, wherein the model of work is defined before execution of the query and defines work to be performed during execution of the query, as included, in some form, in claims 1 and 36. Therefore, since Eigel-Danielson and Lezius et al., alone or in combination, fail to disclose or suggest every element of claims 1 and 36, these claims are allowable.

Claims 3 and 6 depend from claim 1. Claims 38-39 depend from claim 36. As discussed above, claims 1 and 36 are allowable. For at least this reason, and the features recited therein, claims 3, 6 and 38-39 are also allowable.

For at least the reasons above, reconsideration and withdrawal of the rejection of claims 3, 6, and 38-39 under 35 U.S.C. 103 are respectfully requested.

B.   Rejections Based on Eigel-Danielson and Ramakrishnan et al.

Claims 4, 7-11, 13-14, and 40-41 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Eigel-Danielson in view of Ramakrishnan et al. ("Database Management Systems"). Applicants respectfully traverse this rejection for at least the following reasons.

As discussed above, Eigel-Danielson fails to disclose or suggest each and every element of independent claims 1 and 36. Ramakrishnan et al. fails to cure this defect in Eigel-Danielson.

Ramakrishnan et al. discloses an introduction to query optimization (see pages 404-409). However, Ramakrishnan et al. fails to disclose or suggest estimating the progress of a query based on an estimated amount of work performed according to a model of work at a given point during execution of the query and an estimated total amount of work to be performed according to the model of work, wherein the model of work is defined before execution of the query and defines work to be performed during execution of the query, as included, in some form, in claims 1 and 36. Therefore, since Eigel-Danielson and Ramakrishnan et al., alone or in combination, fail to disclose or suggest every element of claims 1 and 36, these claims are allowable.

Claims 4, 7-11 and 13-14 depend from claim 1. Claims 40-41 depend from claim 36. As discussed above, claims 1 and 36 are allowable. For at least this reason, and the features recited therein, claims 4, 7-11, 13-14 and 40-41 are also allowable.

For at least the reasons above, reconsideration and withdrawal of the rejection of claims 4, 7-11, 13-14, and 40-41 under 35 U.S.C. 103 are respectfully requested.

C. Rejections Based on Eigel-Danielson and Kabra et al.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Eigel-Danielson in view of Kabra et al. (Reference C in Applicants IDS dated March 25, 2005). Applicants respectfully traverse this rejection for at least the following reasons.

As discussed above, Eigel-Danielson fails to disclose or suggest each and every element of independent claim 1. Kabra et al. fails to cure this defect in Eigel-Danielson.

Kabra et al. discloses an algorithm that detects sub-optimality of a query execution plan during query execution and attempts to correct the problem (see abstract). However, Kabra et al. fails to disclose or suggest the elements of before

execution of a query, defining a model of work to be performed during execution of the query; estimating a total amount of work that will be performed according to the model; estimating an amount of work performed according to the model at a given point during the execution of the query; and estimating the progress of the query using the estimated amount of work performed and the estimated total amount of work, as included in claim 1. Therefore, since Eigel-Danielson and Kabra et al., alone or in combination, fail to disclose or suggest every element of claim 1, this claim is allowable.

Claim 12 depends from claim 1. As discussed above, claim 1 is allowable. For at least this reason, and the features recited therein, claim 12 is also allowable.

For at least the reasons above, reconsideration and withdrawal of the rejection of claim 12 under 35 U.S.C. 103 are respectfully requested.

D.   Rejections Based on Eigel-Danielson, Ramakrishnan et al. and Kabra et al.

Claims 15, 18, 21-22 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eigel-Danielson in view of Ramakrishnan et al. and further in view of Kabra et al. Applicants respectfully traverse this rejection for at least the following reasons.

As discussed above, Eigel-Danielson, Ramakrishnan et al. and Kabra et al., alone or in combination, fail to disclose or suggest estimating the progress of a query based on an estimated amount of work performed according to a model of work at a given point during execution of the query and an estimated total amount of work to be performed according to the model of work, wherein the model of work is defined before execution of the query and defines work to be performed during execution of the query, as included, in some form, in claims 1 and 36. Therefore, claims 1 and 36 are allowable over these references.

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Claims 15, 18 and 21-22 depend from claim 1. Claim 42 depends from claim 36. As discussed above, claims 1 and 36 are allowable. For at least this reason, and the features recited therein, claims 15, 18, 21-22 and 42 are also allowable.

For at least the reasons above, reconsideration and withdrawal of the rejection of claims 15, 18, 21-22, and 42 under 35 U.S.C. 103 are respectfully requested.

6.   Allowable Subject Matter

Applicants thank the Examiner for indicating that claims 17, 44, and 47 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As discussed above, independent claims 1, 36 and 45 are allowable over the cited prior art. Claims 17, 44 and 47 depend from claims 1, 36 and 45, respectively. Therefore, claims 17, 44 and 47 are dependent upon allowable base claims.

For at least the reasons above, reconsideration and withdrawal of the objection to claims 17, 44 and 47 are respectfully requested.

7.   Claims 19, 20 and 23-34 in Condition for Allowance

Applicants note that claims 19, 20 and 23-34 have been rejected solely based on formal matters arising under 35 U.S.C. 101 and 112. These claims depend from independent claim 1. Based on the amendments to claim 1 and the remarks above regarding the rejections under 35 U.S.C. 101 and 112, claims 19, 20 and 23-34 overcome these formal rejections. Therefore, claims 19, 20 and 23-34 are in condition for allowance.

8.   Conclusion

In view of the above amendment and remarks it is submitted that the claims are patentably distinct over the prior art and that all the rejections to the claims have been overcome.   Reconsideration and reexamination of the above application is requested. Based on the foregoing, applicants respectfully request that the pending claims be allowed, and that a timely Notice of Allowance be issued in this case. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is requested to call the applicants' attorney at the telephone number listed below.

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If this response is not considered timely filed and if a request for an extension of time is otherwise absent, applicants hereby request any necessary extension of time. If there is a fee occasioned by this response, including an extension fee that is not covered by an enclosed check please charge any deficiency to Deposit Account No. 50-0463.

Respectfully submitted,

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Date: February 15, 2007   By: _____ /Sung T. Kim/ _____

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Appendix of corrected drawing replacement sheets

2 Replacement Sheets (Figures 1 and 9)

See below